

Steven D. Vance

Jet Propulsion Laboratory
Mail Stop 183-401
4800 Oak Grove Dr.
Pasadena, CA

Cell: 206.940.1529
Office: 818-393-1097
Fax: 818-354-2494
svance@jpl.nasa.gov

<http://science.jpl.nasa.gov/people/Vance/>
<http://jhn239-2-i22-113.ess.washington.edu/~svance/>

Education

Ph.D. Astrobiology and Geophysics, University of Washington, 2007
Thesis title: High Pressure and Low Temperature Equations of State for Aqueous Sulfate Solutions: Applications to the Search for Life in Extraterrestrial Oceans, with Particular Reference to Europa.

B.S. Physics (with Honors), University of California, Santa Cruz, 2000
Thesis title: The Role of Methanol Frost in Particle Sticking and the Formation of Planets in the Early Solar Nebula.

Recent Research Experience

Habitability Theme Lead, Icy Worlds 2008–present
Astrobiology Team
Isik Kanik Jet Propulsion Laboratory, Pasadena
Coordinated multiple research efforts, by self and others, relating to the origin, sustenance and detectability of life in icy worlds.

NASA Postdoctoral Fellow 2007–present
Chris Webster Jet Propulsion Laboratory, Pasadena
Assisted with ground-based operation and developed scientific applications for the Mars Science Laboratory Tunable Laser Spectrometer. Investigated applications of new insights in physical chemistry to the structure and evolution of habitable planets.

Research Assistant 2001–2007
J. Michael Brown and Evan Abramson University of Washington, Seattle
Constructed and operated high-pressure instrumentation; collected and analyzed sound velocity data for aqueous solutions obtained by the method of impulsive stimulated scattering (ISS). Applied results to understanding physical processes in deep extraterrestrial oceans and hydrothermal systems.

Research Associate 2003–2004
Jody Deming Canadian Arctic Shelf Exchange Study
Prepared and inventoried shipboard laboratory on *CCGS* Amundsen while frozen into Franklin Bay, Northwest Territories, Canada; collected and preserved ice core samples for characterizing winter intra-ice bacterial populations.

Research Associate 2003
Tilman Spohn Institut für Planetologie, Münster
Reviewed hydrothermal systems literature and investigated means for modeling permeability of extraterrestrial seafloors.

Research Associate 2001
Remington Stone UCO/Lick Observatory
Operated Nickel reflector telescope for acquisition of optical SETI data.

Steven D. Vance

Teaching Experience

- Founder and Facilitator 2005-Present
UWAB Planetology Discussion Group University of Washington, Seattle
Organized weekly reviews of selected journal articles pertaining to the formation and evolution of solar and extra-solar system objects.
- Teaching Assistant Winter 2004
Physics University of Washington, Seattle
114/121: Waves/Mechanics. Taught three sections, approximately 20 students per section.
- Visiting Scientist 2002-2003
Project AstroBio Seattle
Presented two guest lectures for a Seattle fifth grade class of approximately 30 students.
- Tutor 2002-2005
University Tutoring Service Seattle
Taught three undergraduate or high-school students per year on average. Topics included algebra, trigonometry, calculus, physical chemistry and introductory physics.
- Teaching Assistant Spring-Summer, 2001
Physics Department University of California, Santa Cruz
5B Labs: Wave motion in matter, including sound waves.
- Mathematics and Physics Tutor 1998-2001
Self-employed University of California, Santa Cruz
Taught two undergraduate or high-school students per year on average. Topics included econometrics, calculus and introductory physics.

Service

- Convener, Oral Session Chair, Astrobiology, Asia Oceania Geosciences Conference, 2009 (submitted)
- Convener, Oral Session Chair, Icy Ocean Worlds, Lunar and Planetary Sciences Conference, 2009 (submitted)
- Participant, AGU Congressional Geosciences Visits, September 2008
- Asia Oceania Geosciences Conference, 2008: Convener, Oral Session Chair, PS08 Satellites and Rings in the Outer Solar System.
- Astrobiology Science Conference, 2008:
- Convener, Oral Session Chair, Session 13. The Deep Cold Biosphere? Interior Processes of Icy Satellites and Dwarf Planets
 - Convener, Session 2. Advances in Astrobiological Instrumentation Development
- Lunar and Planetary Sciences Conference, 2008: Oral Session Chair, Titan
- Lunar and Planetary Sciences Conference, 2007: Oral Session Chair, Astrobiology
- American Geophysical Union Fall Meeting, 2006:
- Oral Session Chair, P31D, Once in a Blue Moon: The Surprising Diversity of Outer Planet Satellites I
 - Poster Session Chair, P23E, Satellites, Rings, and Ices Posters
- Graduate Student Representative at Graduate Preliminary Examinations, Department of Earth and Space Sciences, University of Washington, Seattle, 2005-2006

Steven D. Vance

Awards and Honors

NASA Postdoctoral Fellowship, 2007-2008
Misch Fellowship, 2007
Stephens Graduate Support Grant, 2006
National Science Foundation IGERT/NASA Astrobiology Institute Grant, 2002-2005
Research support, University of Washington Alumni Grant, Winter and Spring, 2003-2004
Elks National Foundation Scholarship, 1996-2000 / Kern County Elks Scholarship, 1996
Howard and Mamie Nichols Scholarship, 1996-2000
Texaco Foundation Scholarship, 1996-2000

Working Papers

Vance, S., Christensen, L.E. and O.J. Johnson, 2009. Measuring Methane and its Isotopes $^{12}\text{CH}_4$, $^{13}\text{CH}_4$ and CH_3D at Mars Analog Field Sites with *In Situ* Laser Spectroscopy: Analysis from Serpentinization-Driven Springs at The Cedars. *in preparation*.

Vance, S., J.M. Brown, E.H. Abramson and N. Castle, 2008. Equations of State for Aqueous MgSO_4 to 2.0 m, 700 MPa from -20 to 100 °C. *in preparation*.

Vance, S., J.M. Brown and N. Castle, 2008. Sound Velocities and Equations of State in Water to 700 MPa and -20 to 100 °C. *JASA*, *submitted*.

J. Castillo-Rogez, M. Haw, S. Vance, D. Matson, T. Johnson 2008. Time of Formation and Chemical Alteration of Small Icy Objects in the Outer Solar System. *submitted for presentation at DPS*, Ithica, NY.

Publications

Vance, S., and J.M. Brown 2008. The Icy Satellite Interior Simulator, an Apparatus for Optical Measurements in Aqueous Systems in the range -20 to 100 °C and 700 MPa. *Rev. Sci. Inst.* **79**(1), 105105.

Vance, S. and J. Goodman, 2009. Physical Oceanography of an Ice-covered Moon. *EUROPA*, University of Arizona Press, *in press*.

Vance, S., J. Harnmeijer, J. Kimura, H. Hussmann, B. de Martin and J. M. Brown, 2007. Hydrothermal Systems in Small Ocean Planets. *Astrobiology* **7**(6), 987-1005.

Vance, S. 2005. Exploration & Characterization of Europa. *in* The Astrobiology Primer: An Outline of General Knowledge—Version 1, 2006. *Eds.* L.J. Mix, J.C. Armstrong, A.M. Mandell, A.C. Mosier, J. Raymond, S.N. Raymond, F.J. Stewart, K. von Braun, and O. Zhaxybayeva *Astrobiology* **6**, 735-813.

Vance, S. and J. M. Brown, 2005. Layering and Double-Diffusion Style Convection in Europa's Ocean. *Icarus* **177**, 506-514.

Vance, S., 2003. Signs of Liquid Water; Life on Jupiter's Moon Europa? *Planets & Life, A Newsletter of the Center for Astrobiology and Early Evolution* **5**, 4.

Recent Oral Presentations

Vance, S., 2009. Serpentinization and the Habitability of Ocean-Bearing Worlds. Colloquium for Virginia, Geosciences Department. **INVITED**

Vance, S., 2009. Serpentinization and the Habitability of Ocean-Bearing Worlds. Colloquium for Case Western Reserve University, Geology Department. **INVITED**

Vance, S., 2009. The Origin and Evolution of Life in Ocean-Bearing Worlds. Colloquium for Case Western Reserve University, Biology Department. **INVITED**

Vance, S., 2008. Serpentinization and the Habitability of Ocean-Bearing Worlds. Colloquium for the University of California Irvine, Department of Earth System Sciences. **INVITED**

Vance, S., and H. Hussmann (presenter) 2008. Tidal Evolution and Hydrothermal Activity in Icy Worlds European Planetary Sciences Conference, Muenster, Germany.

Vance, S., R.T. Pappalardo and J. Baross 2008. Pressure-induced Limits to Hydrothermal Activity in Small Ocean Worlds. Asia Oceania Geosciences Conference, Busan, South Korea.

Vance, S., 2008. Deep Cold Biospheres? Icy Worlds as Cool Places for Life Under Pressure. JPL Director's Seminar.

Vance, S., R.T. Pappalardo and J. Baross 2008. Long-Lived Serpentinization Activity in Habitable Icy Worlds. Astrobiology Science Conference, Santa Clara, CA. **INVITED**

J. Castillo-Rogez, **S. Vance (presenter)**, T. McCord, D. Matson 2008. Hydrothermal Activity: Effects On Evolution of Icy Worlds Focus on Ceres. Astrobiology Science Conference.

J. Castillo-Rogez, D. Matson, J. Kargel, **S. Vance**, T. McCord, T. Johnson 2008. Role of Hydrothermal Geochemistry in the Geophysical Evolution of Icy Bodies. LPSC XXXIX, Houston, TX.

Vance, S., J. M. Brown and C. Sotin 2008. Laboratory Simulations of Titan's Internal Ocean. LPSC XXXIX, Houston, TX.

Vance, S., R.T. Pappalardo and J. Baross 2008. Tidal Evolution and Hydrothermal Activity in Habitable Icy Worlds. Graduate Research Conference on the Origin of Life, Gordon Research Conference, Ventura, CA.

Vance, S., 2008. Improving our understanding of very deep oceans: MgSO_4 chemistry to 700 MPa from -20 to 100 °C. UCLA Earth and Space Sciences Seminar. **INVITED**

Vance, S. and J.M. Brown, 2007. European Ocean Sulfate Chemistry To 700 MPa From -20 to 100 °C. *Eos Trans. AGU, Fall Meet. Suppl.*, Abstract P52A-03.

Recent Poster Presentations

Vance, S., L. Christensen, O. Johnson, P. Morrill and C. R. Webster, 2008. Mars Analog Tunable Laser Spectroscopy at a Site of Active Serpentinization *Eos Trans. AGU, Fall Meet. Suppl.*, Abstract P53C-1461

Vance, S., R.T. Pappalardo and J. Baross, 2008. Tidal Evolution and Hydrothermal Activity in Habitable Icy Worlds. Gordon Research Conference on the Origin of Life, Ventura, CA.

Harnmeijer, J., and **S. Vance**, 2004. The Biopotential of Europa's Ocean: Contribution from Exogenous Sources. Bioastronomy Conference, Reykjavik, Iceland. *Astrobiology* 4, 302.